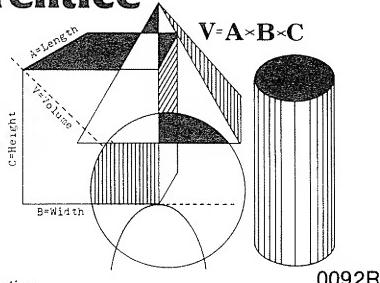


# PROGRAM DOCUMENTATION

Designed  
for use on  
**TRS-80®**  
16K  
LEVEL II

## Archimedes' Apprentice



\*A trademark of Tandy Corporation

# ≡ Archimedes' Apprentice ≡

## INTRODUCTION

The Archimedes' Apprentice package is designed to teach you the formulas for determining the volume of various geometric figures. The package is divided into two programs. The first covers parallelepipeds, prisms, and pyramids. The second program covers cylinders, cones, and spheres. Both programs have sample problems for you to work and final examinations to test how much you have learned.

## Part One

The first figure you'll work with is the parallelepiped. A parallelepiped (also known as a parallelepipedon) is any regular solid figure bounded by six parallelograms, of which the opposite pairs are equal and parallel. This includes cubes and rectangular solids.

The formula to find the volume of a parallelepiped is:

$$V = A \times B \times C$$

V=volume, A=length, B=width, and C=height.

The next figure will be the regular parallelepiped. The ends of a parallelepiped may be in the form of any plane figure such as triangles, squares, rectangles, rhomboids, polygons, and trapezoids, provided both ends are identical.

## TRS-80 LOADING

Unless otherwise indicated on the labels, Level I will be on one side of the cassette and Level II on the other. Make sure that your system is on, the recorder is plugged in, and the tape is rewound. Punch out the tabs on the cassette to prevent accidental erasure. Now insert the tape into your recorder and press PLAY.

Type NEW and press ENTER (E). Check the available memory by typing P.M.(E) for Level I or ?MEM(E) for Level II. Now press PLAY on the recorder and type CLOAD(E). In about ten seconds two asterisks should appear on your screen, with the right-hand one blinking. If it doesn't blink, you're not loading.

The TRS-80 is very sensitive to audio levels. If your program doesn't load, rewind the tape, adjust the volume level, and repeat the loading sequence above.

After each load, run a memory check and note how much memory the program uses.

Should you be unable to load, check the cassette with another system. If it's still no go, return it to:

Instant Software Miseries  
Peterborough NH 03458

We'll check to see whether it was the cassette or your system that was awry and get you a replacement.

## DISCLAIMER

Nothing in this world is completely perfect, including this program. I say this despite the yeoman efforts of the programmer who originally wrote and debugged it and the people in the Instant Software lab who worked far into the New Hampshire nights, all toward providing you with the best possible program.

Please enjoy it. If you come up with any improvements, you should let me know so I can pass along your ideas to other users.

Please note that there is no warranty expressed or implied that this program is going to do anything other than load and work. We don't guarantee that you will enjoy the game programs, that you will make or save money with business programs, or learn anything from educational programs. We don't guarantee that you will lose weight with a dieting program or avoid disasters with a biorhythm program. But if any program causes suffering (other than acute aggravation) or misfortune, we want to hear about it by mail, not through your lawyer. You are entirely on your own in using the programs.

If you run into problems while using a program, you can communicate with us . . . preferably by mail, and we'll try to help out. If a problem turns out to be commonplace, we'll put the update information in MICROCOMPUTING. You are supposed to read MICROCOMPUTING anyway.

Wayne Green

The formula to find the volume of a regular parallelepiped is:

$$V = (A \times H \times N)/2 \times C$$

A=the length of a side, H=the distance to the center of one end, N=the number of sides, and C=the length.

The third figure is the prism or wedge. This is a solid figure with triangular ends and three rectangles as sides.

The formula to find the volume of a prism is:

$$V = (A \times H)/2 \times C$$

A=the length of one of the sides of the triangles, H=the height from the base to the apex, and C=the length of the side.

The final figure you'll be working with in Part One is the pyramid. A pyramid is a solid figure having a plane figure as a base and sides which taper uniformly to a common point known as the apex. The base of a pyramid may be a triangle, a square, a rectangle, a rhombus, a rhomboid, a trapazoid, or a polygon.

The formula for finding the volume of a pyramid with a parallelogram for a base is:

$$V = (A \times B \times H)/3$$

'A and B=the sides of the base and H=the height from the base to the apex. For pyramids with other plane figures for the base, calcu-

late the area of the base, then multiply by H, and divide the product by three.

## Part Two

The first figure covered in Part Two is the cylinder. A cylinder is any solid figure whose two ends are circles of equal size and are parallel to each other — and whose transverse cross-section is circular and uniform throughout its entire length. Also any longitudinal cross-section will be rectangular in shape.

To find the volume of a cylinder, use this formula:

$$V = (3.1416 \times R \times R) \times L$$

R=the radius of the cross section and L=the length of the cylinder.

The next figure covered is the cone. A cone is a solid figure similar to a pyramid except that its base is a circle. The sides of a cone taper uniformly to the apex. A line drawn between the apex and the center of the base will always be perpendicular to the base of the cone.

To find the volume of a cone use this formula:

$$V = (3.1416 \times R \times R \times H)/3$$

## COPYRIGHT

This program is protected by copyright. This means that it is illegal to make a copy of the tape or a listing of the program. Any copy. We feel strongly enough about this to offer a \$10,000 reward for the conviction of anyone copying this program. This means that when your life-long friend and bosom buddy asks you to run off a copy for him, you have, at that moment, to decide whether he wants the program or the ten thou. If you do decide to make the copy, you'd better be very nice to said friend from then on.

Better, if someone is insistent, is to give them the money to buy a cassette of their own. I could be cheaper in the long run.

Why the fuss? We want to make sure that programmers are paid for their programs and paid well. The more money we pay in royalties, the better programs you'll have.

## CASSETTE RECORDER MAINTENANCE

Often when you have trouble loading a program, it's not the fault of the tape or your computer system. It may be a problem with your cassette recorder. The staff at Instant Software use a large variety of cassette recorders eight hours a day, five days a week. To insure that the recorders will keep up with the demands of our work load, they are subjected to a rigorous maintenance routine.

As you run a tape in any recorder, a particle of oxide may flake off the tape, or a bit of dust may settle from the air. These bits of debris may adhere to the play/record head, causing variations in the volume level and degrading the performance of your recorder.

To keep your recorder in top condition, clean the recorder heads regularly after every 15-20 loads or saves. Use denatured alcohol (available at any drugstore) and cotton-tipped swabs. Lightly dampen a swab and gently stroke the erase head, the record/play head, and the pinch roller. This will remove accumulated tape oxide and dust. You can also use a soft brush or vacuum cleaner to remove dust from the tape compartment.

Every time you press the record or play button, you put a small amount of stress on the play/record head. Eventually the head will be pushed out of alignment. This is one of the reasons why a program recorded when you first got your system will not load several months later or won't load on another system.

The cure is to have your recorder aligned by a qualified technician, or if you have the know-how, to align it yourself.

The technicians at Instant Software recommend using an industrial standard alignment tape (they use a Panasonic tape, part No. QZZCFM). This tape allows them to test for playback frequency response, playback level, and the head azimuth adjustment. The most critical aspect, especially for PETs, is the azimuth adjustment.

To run a test on your recorder, connect an oscilloscope to the earphone jack, insert the alignment tape into the recorder, push the play button, and adjust the head for the best waveform on the oscilloscope. If you lack test instruments, adjust the head for the loudest sound and the best high frequency response without changing the recorder's volume setting.

Remember, your recorder is a critical link in your computer system. For the best performance, give it the best care.

R=the radius of the base and H=the perpendicular distance between the base and the apex.

The final figure you'll work with is the sphere. A sphere is a solid figure whose surface, at all points, is equidistant from its center. Any cross-section which is either parallel with, or perpendicular to, any axis of the sphere will be a perfect circle.

To find the volume of a sphere, use this formula:

$$V = 4/3 \times (3.1416 \times R \times R \times R)$$

R=the radius of the sphere.

## CONCLUSION

When doing any of the problems, always use the same units. For example, if you have a problem that involves yards, feet, and inches, first change all the dimensions to inches and then do the problem.

Go through this package in the sequence given. If you have trouble with any of the problems, go back and repeat that section. At the end of each part there will be a comprehensive examination. The computer will score your performance and suggest any sections you may need to repeat.

## ACCIDENTAL ERASING

Until you've tried it, you won't believe how easy it is to screw up a data cassette. For instance, the magnet in any loudspeaker can do a fantastic job of removing part of the data . . . and you'll find loudspeakers in portable radios, cassette recorders, TV sets, etc. Power supplies will do even better. No one can even estimate how many tapes have been wiped out by these little TRS-80 power units . . . or by putting cassettes on top of the monitors, where its electromagnetic field can weave its subtle work.

Do not treat your cassettes casually. Give them extra care and attention. Keep them away from anything electrical, magnetic or dusty at all times.

Well, accidents can happen, even to the most careful of us. One of your kids can try out a data cassette and push the record button . . . etc. You should ward this off by punching out the tabs on the back of the cassette to prevent recording. If things do go awry, we'll redo your cassette for you for a nominal service charge of \$2. Just send back the original cassette, a note as to what went wrong (we like to keep statistics) and the \$2. We'll fix it up for you and get it back as quickly as we can. Try not to get worried if it takes three weeks . . . one week each way for the post office (when they are up to that rigorous a schedule) and a week for us to horse around.

## IMPROVEMENTS

There are very few programs which cannot be improved. If you work out some improvements to this program, it could be worth your while to send them in for possible use in an updated version of the program. Those who contribute to an updated program will share in the royalties which result. Instant Software Inc., Peterborough NH 03458.

## READING



Kilobaud MICROCOMPUTING is designed to help the newcomer to computing to understand computers, while still being interesting to the experts. We try to avoid the use of computerese as much as possible. You'll also find a wealth of software in Kilobaud MICROCOMPUTING . . . and more articles every month than any other magazine.

The crew putting out Kilobaud MICROCOMPUTING are the ones who originated BYTE and are the leaders in the field. Only Kilobaud MICROCOMPUTING has a complete microcomputer laboratory for checking both hardware and software.

Kilobaud MICROCOMPUTING is \$2.50 per copy, but is only \$18 for a one year subscription. Back issues are \$3.50 except for a few rare ones which are \$10. To subscribe just send your name and address to Kilobaud MICROCOMPUTING, Subscription Services Dept. ISI, P.O. Box 997, Farmingdale NY 11737. We'll start with the next published issue and send a bill for the subscription. If you are not delighted with the first issue, just return the bill and we'll be disappointed to lose you. Readers of Kilobaud MICROCOMPUTING are generally very enthusiastic and read it from cover to cover. You can also subscribe by calling (during working hours) 800-258-5473.